

Required for students who earned less than an A on the last test.

Pre Calculus Honors

Unit 3 Exponential and Logarithm Functions Test Prep - DUE _____

You should already have a personal study guide covering the following general topics

- How do I factor trinomials in the form $ax^2 + bx + c$?
- What are inverses (graphically, function wise, and table-based) and how can they be created?
- What are the basic transformations of function graphs and how can they be applied to functions, tables, and graphs?
- How can graphs be read and interpreted to create functions given a parent?

1. To prepare for your test add content to your previous personal study guide. Use the guiding questions below to pull out important topics from Unit 3.

- What are the distinguishing properties of exponential functions, their tables, and their graphs?
- Can I apply transformations to exponentials and work backward from graphs to write exponentials?
- What is e (generally and specifically)?
- What are logarithms and how do I move between logarithm and exponential form? Can I explain how the properties of exponential functions create limits for logarithm functions generally?
- Can I evaluate logarithms for a specific value without needing a calculator? What are natural and common logs?
- How are logarithms graphed and what properties define these graphs? Can I relate this back to exponentials both graphically and algebraically?
- Can I apply transformations to logarithms and work backward from graphs to write logarithms?
- Can I derive the common properties of logarithms (product, quotient, power, change of base) and can I use these properties to expand or simplify logarithmic expressions?
- How do I solve exponential equations with and without the use of a calculator?
- How do I solve logarithmic equations with and without the use of a calculator?
- Can I extend my understanding of solving equations and using properties to work through problems that require an application of both skills?

2. Complete at least three questions from each section on the back of this study guide. This guide is meant to be a general, *basic* review of the topics covered in Unit 3.

3. Review your quizzes, homework, classwork practice, and warm-ups. Practice specifically with the problems you missed!

Your study guide (3 points) and the practice problems (2 points) are homework grades.

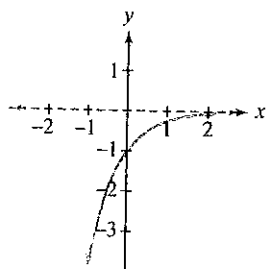
Your test is on _____. You are welcome to attend a tutorial or stop by during lunch (any day but Tuesday) with specific questions or areas to review. Please let Mrs. Pike know in advance that you are coming!

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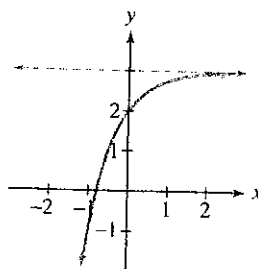
3.1

For 1-2, write the transformed function from parent $y = 4^x$

1.



2.



3. Use transformations of the graph of f to obtain the graph of g . Graph and give equations of all asymptotes. Use the graphs to determine each function's domain and range.

A $f(x) = 3^x$ and $g(x) = 3^x - 1$

B $f(x) = 3^x$ and $g(x) = -3^x$

C $f(x) = \left(\frac{1}{2}\right)^x$ and $g(x) = \left(\frac{1}{2}\right)^{-x}$

D $f(x) = e^x$ and $g(x) = 2e^{\frac{x}{2}}$

3.2

In Exercises 13-15, write each equation in its equivalent exponential form.

13. $\frac{1}{2} = \log_{49} 7$

14. $3 = \log_4 x$

15. $\log_3 81 = y$

In Exercises 16-18, write each equation in its equivalent logarithmic form.

16. $6^3 = 216$

17. $b^4 = 625$

18. $13^y = 874$

In Exercises 19-29, evaluate each expression without using a calculator. If evaluation is not possible, state the reason.

19. $\log_4 64$

20. $\log_5 \frac{1}{25}$

21. $\log_3(-9)$

22. $\log_{16} 4$

23. $\log_{17} 17$

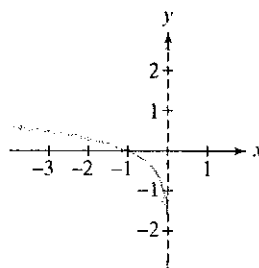
24. $\log_3 3^8$

In Exercises 32-35, the graph of a logarithmic function. Select the function for each graph from the following options.

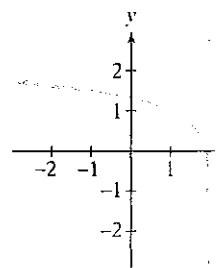
$f(x) = \log x$, $g(x) = \log(-x)$,

$h(x) = \log(2 - x)$, $r(x) = 1 + \log(2 - x)$

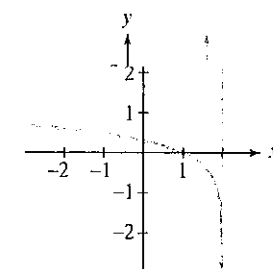
32.



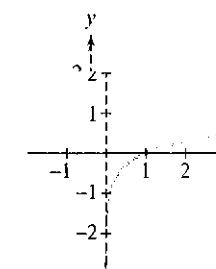
33.



34.



35.



In Exercises 36-38, begin by graphing $f(x) = \log_2 x$. Then use transformations of this graph to graph the given function. What is the graph's x-intercept? What is the vertical asymptote? Use the graphs to determine each function's domain and range.

36. $g(x) = \log_2(x - 2)$

37. $h(x) = -1 + \log_2 x$

38. $r(x) = \log_2(-x)$

3.3. Expand / Condense

Evaluate

51. $\log_4 \left(\frac{\sqrt{x}}{64} \right)$

55. $\log 3 - 3 \log x$

59. $\log_4 0.863$

53. $\ln \sqrt[3]{\frac{x}{e}}$

57. $\frac{1}{2} \ln x - \ln y$

3.4

In Exercises 64–73, solve each exponential equation. Where necessary, express the solution set in terms of natural or common logarithms and use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

64. $2^{4x-2} = 64$

65. $125^x = 25$

66. $10^x = 7000$

67. $9^{x+2} = 27^{-x}$

68. $8^x = 12,143$

69. $9e^{5x} = 1269$

70. $e^{12-5x} - 7 = 123$

71. $5^{4x+2} = 37,500$

72. $3^{x+4} = 7^{2x-1}$

73. $e^{2x} - e^x - 6 = 0$

3.5

In Exercises 74–79, solve each logarithmic equation.

74. $\log_4(3x - 5) = 3$

75. $3 + 4 \ln(2x) = 15$

76. $\log_2(x + 3) + \log_2(x - 3) = 4$

77. $\log_3(x - 1) - \log_3(x + 2) = 2$

78. $\ln(x + 4) - \ln(x + 1) = \ln x$

79. $\log_4(2x + 1) = \log_4(x - 3) + \log_4(x + 5)$